In the Specification

Please amend the paragraph beginning at page 6, line 25 as follows:

--The nodes are grouped into arbitrary sized clusters such that every node is included in at least one cluster and each link is ~~completed~~ completely contained in at least one cluster. Based on the arbitrary sized cluster, messages are defined. Each message has associated sets of source nodes and destination nodes, a value for each state of the destination nodes and a rule that depends on other messages and on selected links connecting the source nodes and destination nodes. The values of each message are updated using the associated rule until a termination condition is reached, at which point the probabilities of the states of the system are determined from the values of the messages. --

B1

Please amend the paragraph beginning at page 16, line 7 as follows:

--As described above with respect to Figure 3, we group 310 the nodes of the network 300 into arbitrary intersecting clusters 311. A cluster is said to be intersecting if a single node appears in more than one cluster. Because we do an arbitrary clustering, we can focus on regions of the model that might be more significant to an exact solution. We require that every node is included in at least cluster. We also require that every link in the Markov network is ~~completed~~ completely included in at least one cluster. The first constraint ensures that our clusters represent and consider all nodes of the model, and the second constraint ensures that the clusters will intersect.--

B2

Please amend the paragraph beginning at page 45, line 7 as follows:

--The marginal probability of a region consisting of two linked nodes is expressed as:

$$P(S_a, S_b) = M_a^e M_a^c M_a^d M_b^f M_b^g M_b^h M_{ab}^{ef} M_{ab}^{ch} \varphi_{ab} \psi_a \psi_b, \qquad [74]$$

where the terms are defined analogously as with equation [73], and, for example, M_{ab}^{ch} means the double-indexed message from source nodes *ch* to destination nodes *ab*. Here, the value φ_{ab} is the compatibility matrix between nodes *a* and *b*, and is a function of S_a and S_b. Figure 8(b) is a graphical representation of Equation [74]. An arrow dragging a line symbolizes a double-indexed message, and a simple line ~~connected~~ connecting two nodes symbolizes a compatibility matrix.--

B3

Please amend the paragraph beginning at page 47, line 25 as follows:

--In the junction tree method, one generates a Markov network equivalent to the original one by grouping the original nodes into "super-nodes." New φ compatibility matrices and ψ evidence functions are also generated for the super-nodes such that the probability of any state using the super-node formulation is equivalent to its probability in the original Markov network. If the super-node Markov network has no loops, one can apply standard belief-propagation to determine exactly the desired marginal probabilities, even if the original Markov network had some loops. Using the standard belief propagation method on a super-node network that was designed to have no loops is called the "junction tree method."--

B4

Please amend the paragraph beginning at page 48, line 16 as follows:

--In our alternative embodiment of our invention, we make a modification to the loopy super-node method which guarantees that [[~~when~~]] it converges. Our modified method also gives results that are equivalent to using a Kikuchi approximation with clusters corresponding to the chosen super-nodes. Thus, our "modified loopy super-node method" is an alternative method that obtains the same results as our "canonical" method described above.--

5
B

Please amend the paragraph beginning at page 58, line 13 as follows:

--An "error-correcting" code is an encoding of digital, e.g., binary, messages. The code adds redundancy that is designed to protect the transmission of the messages from corruption by noise. Typically, the sender of a message transmits "blocks" of bits (binary digits), where each block contains the "data bits" of the original message, plus some additional "check bits" which help to decode the message if it [[~~is~~]] arrives at a receiver in a corrupted form. For example, a check bit may encode the parity of the sum of selected data bits.--

6
B